Response of Early Sweet Grapevines to Foliar Application of Algae Extract and some Micronutrients

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Abstract: This research was done during the two consecutive seasons 2020 and 2021 on Early sweet grapevines grown in sandy soil to investigate the impact of spraying Algae extract at 0.05 to 0.2% and some micronutrients (Fe, Mn, Zn and Cu) at 0.025 to 0.1% on vegetative growth characteristics, nutritional status, yield and quality of Early sweet grapes. Supplying the vines with micronutrients and Algae extract three times during season was accompanied with enhancing growth, yield and fruit quality compared with the control treatment. Spraying Early sweet grapevines grown under sandy soil three times at the beginning of growth (first week of March), just after berry setting (first week of April) and after three week (last week of April) with a mixture of Micromix (containing 6% Fe, 3% Zn, 3% Mn and 1.5 % Cu in chelated) at 0.05% and Algae extract at 0.1% was suggested for obtaining an economical yield and improving physical and chemical characteristics of the berries.

Keywords: Early sweet grapevines - Algae extract, micronutrients - micromix – yield - berries quality

INTRODUCTION

Early sweet grapevine cultivar is a popular and well-known grapevine cultivar that has thrived in the Middle Egyptian climate. Under sandy soil conditions, this cultivar ripens early, perhaps in the last week of May. Furthermore, because of its early ripening character, which reduces completeness, it has a better potential for export to foreign markets. Despite the introduction of various grapevine cultivars to Egypt recently, this grapevine cultivar is still considered one of the most important, popular, and profitable grapevine cultivars.

The smaller the berry and the presence of a higher shoot berry in such grape cultivars, the lower the quality. Respect the most critical difficulty that manufacturing faces, and produce unfavourable clusters from the consumer's perspective. Shot berries in the clusters of such grapevine cultivars are considered a major flaw since they detract from aesthetic appeal and impair output and export potential to a lesser extent. These shoot berries were created from unfertilized blossoms under nutrient and environmental conditions that were unfavourable (Bacha, 1984; Chapman, 1990).

Micronutrients deficiency of as Zn, Fe, Mn and Cu in Egypt soils became a widespread problem in the last thirty, years, their deficiencies cause a great disturbance in the physiological activities of plants which is reflected on reducing yield and lowering quality of the fruits (Aksentyuk and Zhuravel, 1985). Sweet extract being organic and biodegradable in nature is considered as an important source of nutrition for sustainable agriculture (Cassan *et al.,* 1992). Seaweed contains a variety of trace elements, including Zn, Fe, Mn, Cu, Ca, Mo, and Ni, as well as amino acids, vitamins, and plant growth hormones (IAA, cytokinins, and IBA), all of which have a positive impact on plant growth and development (Metting *et al.,* 1990; Soinelli *et al.,* 2009; Abdel- Mawgoud *et al.,* 2010). Seaweed extracts has Many favourable changes in treated plants have been observed, including enhanced crop output, increased nutrient uptake, resilience to frost and stress, extended postharvest shelf life, and lower incidence of fungal and insect attack (Mettiug *et al.,* 1990).

Foliar application of Seaweed extracts has been reported to influence growth, yield and fruit quality of Grapes (Norrie and Branson, 2020; Parrado *et al.,* 2007; Kok *et al.,* 2010) of Keitt mango (Mohamed *et al.*, 2012) of Alphonse mango (Abdel Mawgoud *et al.,* 2010) on Apple trees and (Korkar, 2016) King Ruby seedless grapevines.

The beneficial effect of micron nutrients on vegetative growth, yield and berries quality of grapevines cultivars. Was supported by many authors in Red Roomy grapevines (Abd El-Hady and Ebrahim-Alia, 2001; Abd El- Hameed and Youssef, 2005) on Early Superior (Fadl, 2004) on Ruby seedless (Abd El-Hameed and Abo El- Ezz, 2004) on superior cultivar (Zaki, 2006) and Thompson seedless cv. (Shoeib and El- Sayed, 2003).

The merit the purpose of this research was to look at the effect of some micronutrients and Seaweed extracts on growth, yield and quality berries of Early Sweet grapevines, selecting the best concentrations of micronutrients and Seaweed extract.

MATERIALS AND METHODS:

This study was conducted during 2020 and 2021 seasons on sixty nearly uniform in vigour 11-years old early sweet grapevines grown in private vineyards located at west Abu Qurqas, Abu Qurqas district, Minia Governorate, Egypt. Where the texture of the soil is sandy Table (1) the selected vines are planted at 3.0 x 1.5 meters apart. Winter Pruning was carried out at the second week of December in both seasons using cane pruning system.

The gable shape supporting approach was used to implement the spur pruning system. On the basis of this, the vine burden for all selected vines was adjusted

to 72 eyes (15 fruiting spurs x 4 eyes plus 6 replacement spurs x 2 eyes). Using well water with a salinity of 720 parts per million, a drip irrigation system was used. All fertilizer was added with irrigation water (Fertilization).At the commencement of the experiment, mechanical, physical, and chemical analyses of the examined soil were performed at a depth of 0.0: 90.0 cm (Table 1), and according to the methodologies of (Black *et al.,* 1965).

Table (1): Some physical and chemical analysis of the experimental soil

Constituents	Values	Constituents	Values
Sand %	81.0	Total N %	0.009
Silt %	10.5	Available P (ppm)	1.3
Clay %	8.5	Available K (ppm)	33.0
Texture	Sandy	Zn (ppm)	0.22
pH (1:2.5 extract)	7.92	Fe (ppm)	1.0
EC (1: 2.5 extract) mmhos/1cm 25^{o}C	1.61	Mn (ppm)	0.88
O.M. %	0.14	Cu (ppm)	0.65
CaacO %	0.88		

The experiment included the following ten treatments
T_1-Control (untreated vines)
T_2- Spraying micromix at 0.025% + Algae extract at 0.05%
T_3- Spraying micromix at 0.025% + Algae extract at 0.1 %
T_4- Spraying micromix at 0.025% + Algae extract at 0.2 %
T_5- Spraying micromix at 0.05% + Algae extract at 0.05%
T_6- Spraying micromix at 0.05% + Algae extract at 0.1%
T_7- Spraying micromix at 0.05% + Algae extract at 0.2%
T_8- Spraying micromix at 0.1% + Algae extract at 0.05%
T_9- Spraying micromix at 0.1% + Algae extract at 0.1%
T_{10}- Spraying micromix at 0.1% + Algae extract at 0.2%

Each treatment was replicated three times, two fertilizer containing 6% Fe, 3% Zn, 3% Mn and 1.5 % Cu), were sprayed three times at growth start (first week of March), just after berry setting (first week of April) and on three weeks later (last week of April).

Triton B as a wetting agent for the above treatments including the control of 0.05% spraying was done till run off. Randomized complete block design (RCBD) was adopted where the ten treatments were included replicated three times with two vines per each (Rangswamy, 1995).

1- Vegetative growth:

During both seasons (2020 and 2021) the following parameters were at the last week of April carried out:

- Shoot length (cm).

-Number of leaves/ shoot.

-Leaf area $(cm)^2$ on twenty leaves opposite to the based clusters according to (Ahmed and Morsy, 1999).

-Wood ripening coefficient at the last week of Oct. (Bouard, 1966).

-Cane thickness (cm.)

-Wood pruning weight (kg.)/vine.

2- Chemical constituents of leaves:

Chlorophylls a, b, total chlorophylls, and total carotenoids (mg/1.0 g F.W.) are leaf pigments (Von-Wettstein, 1957).

-N, P, K, and Mg percentages, as well as Fe, Zn, and Mn content (as ppm) in the petiole of the leaves opposite to the basal clusters (1^{st} week May) according to (Summer, 1985; Chapman and Pratt, 1987; Balo *et al.,* 1988).

3-Berry setting and yield:

-Berry setting % was calculated.

-Yield expressed in number of clusters per vine and weight (kg)/vine.

-Harvesting was done when TSS/ acid parameter in the untreated berries reached 25/1 (the first week of June during both seasons).

-Cluster weight (g)

-Berry weight (g) and dimensions (length and diameter in cm).

4-Physical and chemical characteristics of the berries:

-Shot berries % by dividing number of small berry by the product by 100 total of berries per cluster and multiplying

-Chemical characteristics of the berries namely TSS% in the juice using handly refractometer , reducing sugars %, total acidity as a tartaric acid / 100 ml juice and TSS/ acid ratio (AOAC., 2000; Lane and Eynon, 1965).

For comparisons between different treatments, the collected data were collated and statistically evaluated according to (Mead et al., 1993) using new L.S.D. at a 5% level of significance.

RESULTS AND DSCUSSION

A- Vegetative growth characteristics:

It is clear in Table (2) from the data that growth namely shoot length, leaf area, number of leaves/ shoot, , wood ripening coefficient cane thickness and pruning wood weight were significantly stimulated in response to combined application of micromix at 0.025, 0.05 and 0.1% and Algae extract at in comparison to the control therapy at 0.05, 0.1, and 0.2 percent. There was a gradual promotion on vegetative growth characteristics with increasing concentration of Micromix from 0.025 to 0.1% and Algae extract from 0.05 to 0.2%. Using micromix at 0.1% and Algae extract at 0.2% together gave the maximum values of shoot length (121.0, 124.0 cm), number of leaves per shoot (20.5, 21.5 leaf), leaf area (119.8, 121.0 cm^2), coefficient of ripening wood (0.82, 0.84), cane thickness (1.19, 1.20 cm) and wood pruning weight per vine (2.30, 2.35 kg.) during both seasons. The lowest values were measured on vines that had not been treated. These findings were true for the seasons of 2020 and 2021.

B- Chemical components of leaves:

The data in Tables (3, 4) showed that subjecting the vines to combined applications of Micromix at 0.025 to 0.1% and Algae extract at 0.05 to 0.2% in comparison to non-application, increasing chlorophylls a, b, total chlorophylls, total carotenoids, N, P, K, Mg, Zn, Fe, and Mn in the leaves was significantly associated with increased chlorophylls a, b, total chlorophylls, total carotenoids, N, P, K, Mg, Zn, Fe, and Mn.

Spraying Algae extractat 0.2 and Micromix at 0.1% given the highest values. Both seasons yielded the same outcomes.

C- Percentage of berry setting, yield and cluster weight:

Table (5) showed that berry setting %, yield (kg.) as well as number clusters and cluster weight of early sweet grapevines were significantly improved in response to combined application of Micromixat 0.025 to 0.1% and Algae extract at 0.05 to 0.2% compared to the control. The promotion was a gradual on the percentage of berry set, yield as well as number of clusters/ vine and cluster weight with increasing concentrations of Micromix from 0.025 to 0.1 and Algae extract from 0.05 to 0.2%. The best results from economical point of view with regard to yield were obtained when early sweet grapevines were sprayed with Micromix at 0.05% and Algae extract at 0.1%. Under such promised treatment. Yield reached 12.8, 14.45 kg in both seasons respectively. The untreated vines produced 10.78, 10.92 kg. in 2020 and 2021 seasons, respectively. Significant differences on berry setting %, yield, number of cluster and cluster weight were observed among all Micromix concentrations except between the higher two concentrations (0.05 and 0.1%) Algae extract (0.1 and 0.2%). Both seasons yielded the same outcomes.

D- Shot berries Percentage:

It is clear in Table (5) the use of Micromix at 0.025 to 0.1% and Algae extract at 0.05 to 0.2% significantly reduced the percentage of shot berries in comparison to the control group. The decline was clearly associated with increasing the concentrations of Micromix and Algae extract. The lowest values were recorded on the clusters harvested from vines treated with Micromix at 0.1 % and Algae extract at 0.2%. These results were nearly the same during both seasons.

5- Physical and chemical characteristics of the berries:

The treating vines with Micromix at 0.025 to 0.1% and Algae extract at 0.05 to 0.2% was significantly very effective in improved quality of the berries that clear in Table (6) in terms of increasing berry length, berry diameter, TSS%, TSS/ acid and reducing sugars % and decreasing total acidity % compared to the control. The improvement in physical and chemical characters was associated with increasing concentrations of Micromix from 0.025 to 0.1% and Algae extract from 0.05 to 0.2%. No significant promotion on physical and chemical character was observed among the higher concentrations of Micromix (0.05 and 0.1%) and Algae extract (0.1 and 0.2%). Similar results were announced in both the two experimental seasons.

Seaweed extract has positive action on fruiting and growth of Early sweet grapevines because the higher content of some nutrients; N, P, K, Mg, Ca, Zn, Fe, Mn and S, vitamins B complex , amino acids, natural hormones, citokinias and antioxidant (Adam, 1999; Kannaiyan, 2002; Irizar- Garza *et al.,* 2003). It is responsible for eliminating of the plant enemies such as insect weed as and micropial pathogens (Planes Leyva *et al.,* 2003). It uses as soil conditions and slow release fertilizers. These results are in accordance with these obtained by Saleh *et al.* (2006) on Thompsons seedless grapevines, Seleem-Basma and Ahmed (2008) on Thompson seedless grapevines El- Saman (2010) on Flame seedless grapevines Gad El- Kareem and Abd El- Rahman (2013) on Ruby seedless grapevines, Korkar (2016) on King Ruby seedless grapevines and Khalaf (2017) on Early sweet grapevines.

Micronutrients such as Fe, Mn, Zn, Cu and boron has effect on many functions of the plant such as hormone movement, transport of sugars and carbohydrate flowering, fruit setting, metabolism, protein synthesis and development regulating the protein and carbohydrates metabolism (Khayyat *et al.,* 2007; Hansch and Mendel, 2009; Baghdady *et al.,* 2014). The present effects of micronutrients on physical and chemical quality of berries were emphasized as results by AbdEl- Hady and Ibrahiem-Allia (2001), Gobara *et al.* (2002), Ahmed *et al.* (2007) on Red Roomy grapevines and Zaki (2006) on Superior grapevines.

Table (2): Effect of spraying Algae extract and some micronutrients on some vegetative growth characteristics of early sweet grapevines during 2020 and 2021 seasons

Treatments	Shoot length (cm)		No. of leaves per shoot (leaf)		Leaf area $(cm)^2$		Wood ripening coefficient		Cane thickness (cm)		Wood pruning weight (kg.)	
	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021
Spraying Micromix at 0.025 % + Algae extract at 0.05%	103.5	105.5	16.5	17.0	106.5	108.0	0.71	0.72	0.98	1.00	1.92	1.95
Spraying Micromix at 0.025 % + Algae extract at 0.1%	106.0	108.0	17.0	17.5	109.0	110.0	0.73	0.73	1.06	1.11	1.96	1.98
Spraying Micromix at 0.025 % + Algae extract at 0.2%	109.5	111.5	17.5	18.0	112.0	112.5	0.75	0.76	1.09	1.12	2.00	2.05
Spraying Micromix at 0.05 % + Algae extract at 0.05%	105.5	108.0	17.0	17.5	117.0	109.0	0.73	0.74	1.07	1.11	1.98	1.99
Spraying Micromix at 0.05 % + Algae extract at 0.1%	110.0	112.5	17.5	18.0	111.0	112.0	0.76	0.76	1.11	1.12	2.10	2.12
Spraying Micromix at 0.05 % + Algae extract at 0.2%	113.0	115.5	18.0	18.5	115.5	116.0	0.77	0.78	1.14	1.16	2.18	2.20
Spraying Micromix at 0.1 % + Algae extract at 0.05%	112.0	116.0	18.0	18.5	111.2	113.0	0.77	0.78	1.12	1.13	2.15	2.17
Spraying Micromix at 0.1 % + Algae extract at 0.1%	118.0	121.0	19.5	20.0	115.8	116.0.	0.79	0.81	1.18	1.18	2.20	2.21
Spraying Micromix at 0.1 % + Algae extract at 0.2%	121.0	124.0	20.0	21.5	119.8	121.0	0.82	0.84	1.19	1.20	2.30	2.35
Control (untreated vines)	98.5	100.0	16.0	16.5	101.0	103.0	0.69	0.71	0.91	0.96	1.80	1.18
New L.S.D. at 5%	0.9	1.0	0.8	0.8	1.6	1.7	0.25	0.35	0.08	0.09	0.07	0.08

Table (3): Effect of spraying Algae extract and some micronutrients on leaf pigment and percentages of N and P in the leaf of Early Sweet grapevines during 2020 and 2021 seasons

Treatments	Chlorophyll a (mg/1.0 g F.W.)		Chlorophyll b (mg/1.0 g F.W.)		Total Chlorophylls (mg/1.0 g F.W.)		Total carotenoids (mg/1.0 g F.W.)		Leaf N %		Leaf P %	
	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021
Spraying Micromix at 0.025 % + Algae extract at 0.05%	1.71	1.73	1.11	1.13	2.82	2.86	1.18	1.21	1.66	1.71	0.23	0.25
Spraying Micromix at 0.025 % + Algae extract at 0.1%	1.76	1.77	1.16	1.17	2.92	2.94	1.25	1.27	1.69	1.72	0.25	0.26
Spraying Micromix at 0.025 % + Algae extract at 0.2%	1.79	1.80	1.19	1.20	2.98	3.00	1.28	1.30	1.73	1.75	0.27	0.28
Spraying Micromix at 0.05 % + Algae extract at 0.05%	1.77	1.78	1.17	1.18	2.94	3.96	1.26	1.28	1.71	1.73	0.26	0.27
Spraying Micromix at 0.05 % + Algae extract at 0.1%	1.81	1.82	1.21	1.22	3.02	3.04	1.31	1.33	1.77	1.79	0.29	0.31
Spraying Micromix at 0.05 % + Algae extract at 0.2%	1.85	1.86	1.25	1.26	3.10	3.12	1.35	1.36	1.81	1.83	0.33	0.34
Spraying Micromix at 0.1 % + Algae extract at 0.05%	1.83	1.88	1.23	1.28	3.06	3.16	1.33	1.35	1.79	1.81	0.32	0.33
Spraying Micromix at 0.1 % + Algae extract at 0.1%	1.90	1.93	1.31	1.33	3.21	3.26	1.40	1.42	1.83	1.84	0.36	0.38
Spraying Micromix at 0.1 % + Algae extract at 0.2%	1.98	2.06	1.40	1.45	3.38	3.41	1.49	1.52	1.88	1.90	0.39	0.41
Control (untreated vines)	1.62	1.66	1.02	1.06	2.64	2.62	1.12	1.16	1.58	1.61	0.19	0.21
New L.S.D. at 5%	0.08	0.09	0.07	0.08	0.09	0.11	0.05	0.06	0.08	0.09	0.04	0.04

Table (4): Effect of spraying Algae extract and some micronutrients on the percentages of K, Mg, Fe, Mn and Zn in the leaves of Early Sweet grapevines during 2020 and 2021 seasons

Treatments	Leaf K%		Leaf Mg%		Leaf Fe ppm		Leaf Mn ppm		Leaf Zn ppm	
	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021
Spraying Micromix at 0.025 % + Algae extract at 0.05%	1.17	1.18	0.57	0.58	56.2	57.5	57.0	58.2	55.2	56.8
Spraying Micromix at 0.025 % + Algae extract at 0.1%	1.19	1.21	0.61	0.62	57.1	58.0	58.2	58.5	56.3	57.2
Spraying Micromix at 0.025 % + Algae extract at 0.2%	1.22	1.23	0.64	0.66	57.8	59.0	58.8	60.0	56.9	58.2
Spraying Micromix at 0.05 % + Algae extract at 0.05%	1.20	1.22	0.63	0.65	59.9	61.0	60.8	61.9	58.6	60.8
Spraying Micromix at 0.05 % + Algae extract at 0.1%	1.26	1.27	0.68	0.69	61.2	62.5	62.5	63.5	60.9	61.8
Spraying Micromix at 0.05 % + Algae extract at 0.2%	1.29	1.30	0.73	0.75	62.5	63.0	63.6	64.2	61.8	62.7
Spraying Micromix at 0.1 % + Algae extract at 0.05%	1.28	1.29	0.71	0.73	68.2	69.0	69.1	70.1	67.5	68.2
Spraying Micromix at 0.1 % + Algae extract at 0.1%	1.36	1.38	0.78	0.79	72.0	73.0	73.0	74.0	71.2	72.6
Spraying Micromix at 0.1 % + Algae extract at 0.2%	1.40	1.41	0.81	0.82	74.0	75.0	75.0	76.2	73.5	74.2
Control (untreated vines)	1.14	1.16	0.53	0.55	51.0	52.0	51.5	52.2	50.0	50.0
New L.S.D. at 5%	0.05	0.06	0.03	0.03	1.3	1.4	1.4	1.5	1.2	1.3

Table (5): Effect of spraying Algae extract and some micronutrients on the percentage of berry setting, yield/vine, number and weight cluster as well as shot berry % and berry weight of Early sweet grapevines during 2020 and 2021 seasons

Treatments	Berry setting %		No. of clusters/vine		Average cluster weight (g.)		Yield/vine (kg.)		Shot berries %		Berry weight (g.)	
	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021
Spraying Micromix at 0.025 % + Algae extract at 0.05%	9.5	9.7	28.0	29.0	390.0	395.0	10.92	11.46	7.55	7.30	4.65	4.70
Spraying Micromix at 0.025 % + Algae extract at 0.1%	9.8	9.9	28.0	31.0	400.0	405.0	11.20	12.56	6.86	6.70	4.80	4.85
Spraying Micromix at 0.025 % + Algae extract at 0.2%	10.0	10.1	29.0	33.0	411.0	415.0	11.92	13.70	6.15	6.00	4.90	4.95
Spraying Micromix at 0.05 % + Algae extract at 0.05%	9.9	10.0	28.0	32.0	408.0	410.0	11.42	13.12	6.20	6.10	4.85	4.90
Spraying Micromix at 0.05 % + Algae extract at 0.1%	10.3	10.4	29.0	34.0	420.0	425.0	12.18	14.45	5.80	5.75	5.00	5.05
Spraying Micromix at 0.05 % + Algae extract at 0.2%	10.6	10.7	28.0	35.0	430.0	435.0	12.04	15.23	5.70	5.65	5.18	5.22
Spraying Micromix at 0.1 % + Algae extract at 0.05%	10.5	10.6	28.0	34.0	425.0	430.0	11.90	14.62	5.75	5.70	5.10	5.15
Spraying Micromix at 0.1 % + Algae extract at 0.1%	10.9	11.0	29.0	36.0	433.0	438.0	12.56	15.77	5.30	5.25	5.30	5.33
Spraying Micromix at 0.1 % + Algae extract at 0.2%	11.2	11.3	28.0	36.0	440.0	445.0	12.32	16.02	4.80	4.50	5.50	5.65
Control (untreated vines)	9.3	9.5	28.0	28.0	385.0	390.0	10.78	10.92	8.18	8.25	4.50	4.60
New L.S.D. at 5%	0.5	0.6	NS	1.8	9.2	9.8	0.4	0.8	0.5	0.4	0.07	0.08

Table (6): Effect of spraying Algae extract and some micronutrients on some physical and chemical characteristics of Early sweet grapevines during 2020 and 2021 seasons

Treatments	Berry length (cm)		Berry diameter (cm)		TSS%		Total acidity%		TSS/acid		Reducing sugars%	
	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021
Spraying Micromix at 0.025 % + Algae extract at 0.05%	2.22	2.23	1.92	1.93	18.1	18.3	0.680	0.675	26.6	27.1	15.0	15.2
Spraying Micromix at 0.025 % + Algae extract at 0.15%	2.25	2.26	1.95	1.96	18.4	18.6	0.670	0.665	27.4	27.9	15.3	15.5
Spraying Micromix at 0.025 % + Algae extract at 0.2%	2.27	2.28	1.98	1.99	18.7	18.8	0.650	0.640	28.8	29.4	15.6	15.7
Spraying Micromix at 0.05 % + Algae extract at 0.05%	2.26	2.27	1.97	1.98	18.5	18.7	0.655	0.650	28.2	28.8	15.4	15.6
Spraying Micromix at 0.05 % + Algae extract at 0.1%	2.29	2.29	2.00	2.00	18.9	19.1	0.630	0.625	30.0	30.6	15.9	16.0
Spraying Micromix at 0.05 % + Algae extract at 0.2%	2.31	2.33	2.02	2.05	19.5	19.6	0.610	0.600	31.9	32.6	16.4	16.5
Spraying Micromix at 0.1 % + Algae extract at 0.05%	2.30	2.31	2.01	2.03	19.3	19.4	0.615	0.605	31.4	32.0	16.2	16.3
Spraying Micromix at 0.1 % + Algae extract at 0.1%	2.40	2.45	2.11	2.12	19.9	20.2	0.585	0.580	34.0	34.8	16.8	17.0
Spraying Micromix at 0.1 % + Algae extract at 0.2%	2.50	2.60	2.18	2.20	20.7	21.0	0.550	0.540	37.6	38.9	17.5	17.8
Control (untreated vines)	2.15	2.16	1.85	1.86	17.6	17.8	0.710	0.705	24.8	25.2	14.3	14.5
New L.S.D. at 5%	0.04	0.05	0.03	0.04	0.3	0.4	0.021	0.022	1.1	1.2	0.3	0.4

CONCLUSION

For promoting yield and berries quality of Early sweet grapevines as well as reducing the percentage of shot berry in the cluster it is advised to spray the grapevines three times with a mixture of 0.1% Algae extract and Micromix (containing 6.0 % Fe, 3.0% Zn, 3.0% Mn and 1.5% Cu in chelated form) at 0.05% at the growth begins, just after berry setting and then after three weeks.

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استجابة العنب الإيرلي سويت للرش الورقى بمستخلص الطحالب وبعض العناصر الصغرى

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أجريت هذه الدراسة خلال موسمين متتاليين هما ٢٠٢٠و ٢٠٢١ على كرمات عنب ايرلى سويت نامية في تربة رملية وكان الهدف من الدراسة اختيار تأثير رش مستخلص الطحالب بتركيز من ٠.٠٥ إلى ٠.٢% وبعض العناصر الغذائية الصغرى(الحديد والمنجنيز والزنك والنحاس) بتركيز من ٠.٢٥ إلى ٠.١% على صفات النمو الخضري والحالة الغذائية للكرمات وكمية المحصول وخصائص الجودة لحبات العنب الايرلى سويت. لقد أدى رش الكرمات بالعناصر الصغرى ومستخلص الطحالب ثلاثة مرات خلال موسم النمو إلى تحسن واضح في النمو والمحصول وخصائص الجودة للثمار وذلك بالمقارنة بمعاملة الكونترول. طبقا للنتائج المتحصل عليها في هذه التجربة فانه يقترح رش كرمات العنب الايرلى سويت النامية في التربة الرملية ثلاثة مرات في بداية النمو الخضري (الأسبوع الأول من مارس) وبعد العقد مباشرا (الأسبوع الأول من أبريل) وبعدها بثلاثة أسابيع (الأسبوع الأخير من أبريل) بمركب الميكرومكس (مركب يحتوى على ٦% حديد ٣% منجنيز و ٣% زنك و١.٥ % نحاس في الصورة الكيلاتية) بتركيز ٠.٠٥% مع مستخلص الطحالب بتركيز ٠.١% وذلك للحصول على محصول اقتصادي وتحسين خصائص الجودة الطبيعية والكيميائية للحبات.

الكلمات الدالة: العنب الايرلى سويت- مستخلص الطحالب- العناصر الصغرى- ميكرومكس- المحصول - جودة الحبات